



SEQUENCE LISTING

<120> Patten, Phillip
Stemmer, Willem P.C.

<120> METHODS AND COMPOSITIONS FOR POLYPEPTIDE ENGINEERING

<130> 02-020501US

<140> 09/339,926
<141> 1999-06-24

<150> 08/769,062
<151> 1996-12-18

<150> 08/198,431
<151> 1994-02-17

<150> 08/425,684
<151> 1995-04-18

<150> 08/537,874
<151> 1995-10-30

<160> 101

<170> PatentIn Ver. 2.0

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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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<210> 9
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oligonucleotide used for codon usage library

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<210> 11
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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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oligonucleotide used for codon usage library

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<210> 16
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oligonucleotide used for codon usage library

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<210> 17
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<210> 18
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oligonucleotide used for codon usage library

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<210> 21
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oligonucleotide used for codon usage library

<400> 22
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oligonucleotide used for codon usage library

<400> 23
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<210> 24
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oligonucleotide used for codon usage library

<400> 24
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<210> 25
<211> 60
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<210> 26
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<400> 26
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<210> 27

<211> 60
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<210> 28
<211> 60
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oligonucleotide used for codon usage library

<400> 28
atggcttcg ctggttgcgt dgarccdtay acygaytgya acctgccggc tccgaccacc 60

<210> 29
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<400> 29
tgctcacctg gctgcttmac cdcccdccct ggcdctgctg gctggtgcta tgctgctcct 60
c 61

<210> 30
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oligonucleotide used for codon usage library

<400> 30
ttccgcctct agagaattct tartacagrg thgghgccag gaggagcagc atagcaccag 60
cc 62

<210> 31
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<212> DNA
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<400> 31
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<210> 32
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oligonucleotide used for codon usage library

<400> 32
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<210> 33
<211> 60
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<400> 33
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<210> 34
<211> 60
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<400> 34
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<210> 35
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<210> 36
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oligonucleotide used for codon usage library

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<210> 37
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<210> 38
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oligonucleotide used for codon usage library

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<210> 39
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oligonucleotide used for codon usage library

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<210> 40
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oligonucleotide used for codon usage library

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<210> 41
<211> 60

<212> DNA
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<220>
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oligonucleotide used for codon usage library

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<210> 42
<211> 60
<212> DNA
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oligonucleotide used for codon usage library

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<210> 43
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
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oligonucleotide used for codon usage library

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<210> 44
<211> 60
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oligonucleotide used for codon usage library

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<210> 45
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<220>
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oligonucleotide used for codon usage library

<400> 45
cactggttgt aacgagcagc hgcrghacrc ccratrgtrc ggttagttacc tttaacaccg 60

<210> 46
<211> 60
<212> DNA
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oligonucleotide used for codon usage library

<400> 46
accagcagag tccggaacct grcgrtchac rttrtargtt ttagacagag caacgtacgg 60

<210> 47
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oligonucleotide used for codon usage library

<400> 47
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<210> 48
<211> 60
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oligonucleotide used for codon usage library

<400> 48
cccaggaaca ggataacgtt ytthgchgcr gtytgrathg gctgcagttt tttagcaacg 60

<210> 49
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 49
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<210> 50
<211> 60
<212> DNA
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<220>
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oligonucleotide used for codon usage library

<400> 50
cctgagcaga cataacacca gchgchachg chachgccag cggcagttt cgcagggtga 60

<210> 51
<211> 62
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<220>
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oligonucleotide used for codon usage library

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tc 62

<210> 52
<211> 59
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oligonucleotide used for codon usage library

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<210> 53
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oligonucleotide used for codon usage library

<400> 53
aagagatagc gatcggttg gtcaghacra trcccagcag ttttagcacgc atatgtatat 60

<210> 54
<211> 58
<212> DNA
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<220>
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oligonucleotide used for codon usage library

<400> 54
caacggtagc gaaaccagcc aghgchachg crathgrat agcggtttt ttcatatg 58

<210> 55
<211> 39
<212> DNA
<213> Artificial Sequence

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<220>
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<210> 56
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
      oligonucleotide used for codon usage library

<400> 56
tgagaggttg agggtccaaat tgggaggtca aggcttggg 39

<210> 57
<211> 18
<212> DNA
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<220>
<223> Description of Artificial Sequence: degenerate
      oligonucleotide used for alpha interferon
      shuffling

<400> 57
tgtratctgy ctsagacc 18

<210> 58
<211> 23
<212> DNA
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<220>
<223> Description of Artificial Sequence: degenerate
      oligonucleotide used for alpha interferon
      shuffling

<400> 58
ggcacaaatg vgmagaatct ctc 23

<210> 59
<211> 22
<212> DNA
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<220>
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      oligonucleotide used for alpha interferon
      shuffling

<400> 59

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agagattctk cbcatttgcc	22
<210> 60	
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cagttccaga agrctsmagc catc	24
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<211> 24	
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cttcaatctc ttcascacaa	19
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<213> Artificial Sequence

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<210> 65
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      shuffling

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<210> 66
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<220>
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<210> 67
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<220>
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      shuffling

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attcakttgc tggwhaaagt c                                21

<210> 68
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<212> DNA
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shuffling

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ggactycatc ctggctgtg 19

<210> 69
<211> 19
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<220>
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oligonucleotide used for alpha interferon
shuffling

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<210> 70
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oligonucleotide used for alpha interferon
shuffling

<400> 70
aagaatca 18

<210> 71
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oligonucleotide used for alpha interferon
shuffling

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agataaaagag tgattctt 18

<210> 72
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<220>
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oligonucleotide used for alpha interferon
shuffling

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<210> 73
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<220>
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 oligonucleotide used for alpha interferon
 shuffling

<400> 73
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19

<210> 74
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<220>
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 oligonucleotide used for alpha interferon
 shuffling

<400> 74
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18

<210> 75
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 <213> consensus alpha interferon

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Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
 20 25 30

Arg His Asp Phe Gly Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
 35 40 45

Gln Lys Ala Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
 50 55 60

Phe Asn Leu Phe Ser Thr Lys Asp Ser Ser Ala Ala Trp Glu Gln Ser
 65 70 75 80

Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asp Leu
 85 90 95

Glu Ala Cys Val Ile Gln Glu Val Gly Val Glu Glu Thr Pro Leu Met
 100 105 110

Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
 115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val

130

135

140

Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
145 150 155 160

Arg Leu Arg Arg Lys Asp
165

<210> 76
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<212> PRT
<213> human alpha interferon

<400> 76
Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
20 25 30

Arg His Asp Phe Gly Leu Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
35 40 45

Gln Lys Thr Gln Ala Ile Pro Val Leu His Glu Met Ile Gln Gln Thr
50 55 60

Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu Gln Ser
65 70 75 80

Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asn Leu
85 90 95

Glu Ala Cys Val Ile Gln Glu Val Gly Met Glu Glu Thr Pro Leu Met
100 105 110

Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
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Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
145 150 155 160

Arg Leu Arg Arg Lys Asp
165

<210> 77
<211> 166
<212> PRT
<213> human alpha interferon

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Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
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 Arg Pro Asp Phe Gly Leu Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
 35 40 45
 Gln Lys Thr Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
 50 55 60
 Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu Gln Ser
 65 70 75 80
 Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asn Leu
 85 90 95
 Glu Ala Cys Val Ile Gln Glu Val Gly Met Glu Glu Thr Pro Leu Met
 100 105 110
 Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
 115 120 125
 Leu Tyr Leu Thr Glu Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
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 Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
 145 150 155 160
 Ile Leu Arg Arg Lys Asp
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<210> 78
 <211> 166
 <212> PRT
 <213> human alpha interferon

<400> 78
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 Arg His Asp Phe Glu Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
 35 40 45
 Gln Lys Ala Gln Ala Ile Ser Val Leu His Glu Met Met Gln Gln Thr
 50 55 60
 Phe Asn Leu Phe Ser Thr Lys Asn Ser Ser Ala Ala Trp Asp Glu Thr
 65 70 75 80
 Leu Leu Glu Lys Phe Tyr Ile Glu Leu Phe Gln Gln Met Asn Asp Leu
 85 90 95
 Glu Ala Cys Val Ile Gln Glu Val Gly Val Glu Glu Thr Pro Leu Met

100

105

110

Asn Glu Asp Ser Ile Leu Ala Val Lys Lys Tyr Phe Gln Arg Ile Thr
115 120 125

Leu Tyr Leu Met Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
130 135 140

Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
145 150 155 160

Arg Leu Arg Arg Lys Asp
165

<210> 79
<211> 166
<212> PRT
<213> human alpha interferon

<400> 79
Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser His Phe Ser Cys Leu Lys Asp
20 25 30

Arg His Asp Phe Gly Phe Pro Glu Glu Phe Asp Gly His Gln Phe
35 40 45

Gln Lys Thr Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
50 55 60

Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu Gln Ser
65 70 75 80

Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asp Leu
85 90 95

Glu Ala Cys Val Ile Gln Glu Val Gly Val Glu Glu Thr Pro Leu Met
100 105 110

Asn Val Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
130 135 140

Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
145 150 155 160

Arg Leu Arg Arg Lys Asp
165

<210> 80
<211> 166

<212> PRT

<213> human alpha interferon

<400> 80

Cys Asp Leu Pro Gln Thr His Ser Leu Gly His Arg Arg Thr Met Met
1 5 10 15

Leu Leu Ala Gln Met Arg Arg Ile Ser Leu Phe Ser Cys Leu Lys Asp
20 25 30

Arg His Asp Phe Arg Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
35 40 45

Gln Lys Ala Glu Ala Ile Ser Val Leu His Glu Val Ile Gln Gln Thr
50 55 60

Phe Asn Leu Phe Ser Thr Lys Asp Ser Ser Val Ala Trp Asp Glu Arg
65 70 75 80

Leu Leu Asp Lys Leu Tyr Thr Glu Leu Tyr Gln Gln Leu Asn Asp Leu
85 90 95

Glu Ala Cys Val Met Gln Glu Val Trp Val Gly Gly Thr Pro Leu Met
100 105 110

Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
130 135 140

Arg Ala Glu Ile Met Arg Ser Phe Ser Ser Arg Asn Leu Gln Glu
145 150 155 160

Arg Leu Arg Arg Lys Glu
165

<210> 81

<211> 166

<212> PRT

<213> human alpha interferon

<400> 81

Cys Asp Leu Pro Gln Thr His Ser Leu Arg Asn Arg Arg Ala Leu Ile
1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
20 25 30

Arg His Glu Phe Arg Phe Pro Glu Glu Phe Asp Gly His Gln Phe
35 40 45

Gln Lys Thr Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
50 55 60

Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu Gln Ser

65	70	75	80												
Leu	Leu	Glu	Lys	Phe	Ser	Thr	Glu	Leu	Tyr	Gln	Gln	Leu	Asn	Asp	Leu
				85				90					95		
Glu	Ala	Cys	Val	Ile	Gln	Glu	Val	Gly	Val	Glu	Glu	Thr	Pro	Leu	Met
				100			105					110			
Asn	Glu	Asp	Phe	Ile	Leu	Ala	Val	Arg	Lys	Tyr	Phe	Gln	Arg	Ile	Thr
				115			120					125			
Leu	Tyr	Leu	Met	Glu	Lys	Lys	Tyr	Ser	Pro	Cys	Ala	Trp	Glu	Val	Val
				130			135				140				
Arg	Ala	Glu	Ile	Met	Arg	Ser	Phe	Ser	Phe	Ser	Thr	Asn	Leu	Lys	Lys
				145			150				155			160	
Gly	Leu	Arg	Arg	Lys	Asp										
				165											

<210> 82
 <211> 166
 <212> PRT
 <213> human alpha interferon

<400> 82															
Cys	Asp	Leu	Pro	Gln	Thr	His	Ser	Leu	Gly	Asn	Arg	Arg	Ala	Leu	Ile
1				5				10					15		
Leu	Leu	Ala	Gln	Met	Arg	Arg	Ile	Ser	Pro	Phe	Ser	Cys	Leu	Lys	Asp
				20			25					30			
Arg	His	Asp	Phe	Glu	Phe	Pro	Gln	Glu	Glu	Phe	Asp	Asp	Lys	Gln	Phe
				35			40					45			
Gln	Lys	Ala	Gln	Ala	Ile	Ser	Val	Leu	His	Glu	Met	Ile	Gln	Gln	Thr
				50			55				60				
Phe	Asn	Leu	Phe	Ser	Thr	Lys	Asp	Ser	Ser	Ala	Ala	Leu	Asp	Glu	Thr
				65			70				75		80		
Leu	Leu	Asp	Glu	Phe	Tyr	Ile	Glu	Leu	Asp	Gln	Gln	Leu	Asn	Asp	Leu
				85			90					95			
Glu	Ser	Cys	Val	Met	Gln	Glu	Val	Gly	Val	Ile	Glu	Ser	Pro	Leu	Met
				100			105					110			
Tyr	Glu	Asp	Ser	Ile	Leu	Ala	Val	Arg	Lys	Tyr	Phe	Gln	Arg	Ile	Thr
				115			120					125			
Leu	Tyr	Leu	Thr	Glu	Lys	Lys	Tyr	Ser	Ser	Cys	Ala	Trp	Glu	Val	Val
				130			135				140				
Arg	Ala	Glu	Ile	Met	Arg	Ser	Phe	Ser	Leu	Ser	Ile	Asn	Leu	Gln	Lys
				145			150				155			160	

Arg Leu Lys Ser Lys Glu
165

<210> 83
<211> 166
<212> PRT
<213> human alpha interferon

<400> 83
Cys Asp Leu Pro Glu Thr His Ser Leu Asp Asn Arg Arg Thr Leu Met
1 5 10 15

Leu Leu Ala Gln Met Ser Arg Ile Ser Pro Ser Ser Cys Leu Met Asp
20 25 30

Arg His Asp Phe Gly Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
35 40 45

Gln Lys Ala Pro Ala Ile Ser Val Leu His Glu Leu Ile Gln Gln Ile
50 55 60

Phe Asn Leu Phe Thr Thr Lys Asp Ser Ser Ala Ala Trp Asp Glu Asp
65 70 75 80

Leu Leu Asp Lys Phe Cys Thr Glu Leu Tyr Gln Gln Leu Asn Asp Leu
85 90 95

Glu Ala Cys Val Met Gln Glu Glu Arg Val Gly Glu Thr Pro Leu Met
100 105 110

Asn Ala Asp Ser Ile Leu Ala Val Lys Lys Tyr Phe Arg Arg Ile Thr
115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
130 135 140 140

Arg Ala Glu Ile Met Arg Ser Leu Ser Leu Ser Thr Asn Leu Gln Glu
145 150 155 160

Arg Leu Arg Arg Lys Glu
165

<210> 84
<211> 166
<212> PRT
<213> human alpha interferon

<400> 84
Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
20 25 30

Arg His Asp Phe Gly Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe

35

40

45

Gln Lys Ala Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
50 55 60

Phe Asn Leu Phe Ser Thr Lys Asp Ser Ser Ala Ile Trp Glu Gln Ser
65 70 75 80

Leu Leu Glu Lys Phe Ser Thr Glu Leu Asn Gln Gln Leu Asn Asp Met
85 90 95

Glu Ala Cys Val Ile Gln Glu Val Gly Val Glu Glu Thr Pro Leu Met
100 105 110

Asn Val Asp Ser Ile Leu Ala Val Lys Lys Tyr Phe Gln Arg Ile Thr
115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
130 135 140

Arg Ala Glu Ile Met Arg Ser Phe Ser Leu Ser Lys Ile Phe Gln Glu
145 150 155 160

Arg Leu Arg Arg Lys Ser
165

<210> 85

<211> 166

<212> PRT

<213> human alpha interferon

<400> 85

Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
20 25 30

Arg Pro Asp Phe Gly Leu Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
35 40 45

Gln Lys Thr Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
50 55 60

Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu Gln Ser
65 70 75 80

Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asn Leu
85 90 95

Glu Ala Cys Val Ile Gln Glu Val Gly Met Glu Glu Thr Pro Leu Met
100 105 110

Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
130 135 140

Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
145 150 155 160

Ile Leu Arg Arg Lys Asp
165

<210> 86
<211> 166
<212> PRT
<213> human alpha interferon

<400> 86
Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser His Phe Ser Cys Leu Lys Asp
20 25 30

Arg Tyr Asp Phe Gly Phe Pro Gln Glu Val Phe Asp Gly Asn Gln Phe
35 40 45

Gln Lys Ala Gln Ala Ile Ser Ala Phe His Glu Met Ile Gln Gln Thr
50 55 60

Phe Asn Leu Phe Ser Thr Lys Asp Ser Ser Ala Ala Trp Asp Glu Thr
65 70 75 80

Leu Leu Asp Lys Phe Tyr Ile Glu Leu Phe Gln Gln Leu Asn Asp Leu
85 90 95

Glu Ala Cys Val Thr Gln Glu Val Gly Val Glu Glu Ile Ala Leu Met
100 105 110

Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
115 120 125

Leu Tyr Leu Met Gly Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
130 135 140

Arg Ala Glu Ile Met Arg Ser Phe Ser Phe Ser Thr Asn Leu Gln Lys
145 150 155 160

Gly Leu Arg Arg Lys Asp
165

<210> 87
<211> 501
<212> DNA
<213> consensus alpha interferon

<400> 87
tgtatctgc ctcagaccca cagcctgggt aataggaggg ccttgatact cctggcacaa 60

atggaagaa tctccctt ctcgcctg aaggacagac atgactttgg attccccag 120
gaggagttt atggcaacca gttccagaag gctcaagcca tctctgcctt ccatgagatg 180
atccagcaga cttcaatct cttcagcaca aaggactcat ctgctgctt gatatgagagc 240
ctcctagaaa aattttccac tgaactttac cagcaactga atgaccttgg agcctgtgtg 300
atacaggagg ttgggatgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
agaaaatact tccaaagaat cactcttata tctacagaga agaaatacag cccttgc 420
tggaggttgc tcaagcaga aatcatgaga tccctctt tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattt a 501

<210> 88
<211> 501
<212> DNA
<213> human alpha interferon

<400> 88
tgtatctgc ctcagaccca cagcctgggt aataggaggg cttgataact cttggcacaa 60
atggaagaa tctccctt ctcgcctg aaggacagac atgactttgg attccccag 120
gaggagttt atggcaacca gttccagaag actcaagcca tccctgcctt ccatgagatg 180
atccagcaga cttcaatct cttcagcaca gaggactcat ctgctgctt gatatgagagc 240
ctcctagaaa aattttccac tgaactttac cagcaactga atgaccttgg agcctgtgtg 300
atacaggagg ttgggatgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
agaaaatact tccaaagaat cactcttata tctacagaga agaaatacag cccttgc 420
tggaggttgc tcaagcaga aatcatgaga tccctctt tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattt a 501

<210> 89
<211> 501
<212> DNA
<213> human alpha interferon

<400> 89
tgtatctgc ctcagaccca cagcctgggt aataggaggg cttgataact cttggcacaa 60
atggaagaa tctccctt ctcgcctg aaggacagac ctgactttgg attccccag 120
gaggagttt atggcaacca gttccagaag actcaagcca tccctgcctt ccatgagatg 180
atccagcaga cttcaatct cttcagcaca gaggactcat ctgctgctt gatatgagagc 240
ctcctagaaa aattttccac tgaactttac cagcaactga atgaccttgg agcctgtgtg 300
atacaggagg ttgggatgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
agaaaatact tccaaagaat cactcttata tctacagaga agaaatacag cccttgc 420
tggaggttgc tcaagcaga aatcatgaga tccctctt tttcaacaaa cttgcaaaaa 480
atattaagga ggaaggattt a 501

<210> 90
<211> 501
<212> DNA
<213> human alpha interferon

<400> 90
tgtaatctgt ctcacaccca cagcctgaat aacaggagga ctttgatgt catggcacaa 60
atgaggagaa tctccctt ctcgcctg aaggacagac atgactttga attccccag 120
gaggatgg atggcaacca gttccagaaa gctcaagcca tccctgcctt ccatgagatg 180
atgcagcaga cttcaatct cttcagcaca aagaactcat ctgctgctt gatatgagacc 240
ctcctagaaa aattctacat tgaacttttc cagcaatga atgaccttgg agcctgtgtg 300
atacaggagg ttgggatgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
agaaaatact tccaaagaat cactcttata tctacagaga agaaatacag cccttgc 420
tggaggttgc tcaagcaga aatcatgaga tccctctt tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattt a 501

<210> 91
<211> 501
<212> DNA
<213> human alpha interferon

<400> 91
tgtgatctgc ctcagaccca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
atggaaagaa tctctccctt ctcatgcctg aaggacagac atgatttcgg attccccgag 120
gaggagttt atggccacca gttccagaag actcaagcca tctctgtcct ccatgagatg 180
atccagcaga ccttcaatct cttcagcaca gaggactcat ctgctgctt ggaacagagc 240
ctcctagaaa aatttccac tgaactttac cagcaactga atgacctgga agcatgtgtg 300
atacaggagg ttggggtgga agagactccc ctgatgaatg tgactccat cctggctgtg 360
agaaaatact tccaaagaat cactcttat ctaacagaga agaaatacag cccttgc 420
tgggaggttgc tcaagcaga aatcatgaga tcctctcgat tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattt a 501

<210> 92
<211> 501
<212> DNA
<213> human alpha interferon

<400> 92
tgtgatctgc ctcagaccca cagcctgggt cacaggagga ccatgatgct cctggcacaa 60
atgaggagaa tctctctttt ctcctgtctg aaggacagac atgacttcag attccccag 120
gaggagttt atggcaacca gttccagaag gctgaagcca tctctgtcct ccatgaggtg 180
attcagcaga ccttcaatct cttcagcaca aaggactcat ctgctgctt ggtatgagagg 240
cttctagaca aactctatac tgaactttac cagcagctga atgacctgga agcctgtgtg 300
atgcaggagg ttggggtggg agggactccc ctgatgaatg aggactccat cctggctgtg 360
agaaaatact tccaaagaat cactctctac ctgacagaga aaaagtacag cccttgc 420
tgggaggttgc tcaagcaga aatcatgaga tcctctctt catcaagaaa cttgcaagaa 480
aggttaagga ggaaggaata a 501

<210> 93
<211> 501
<212> DNA
<213> human alpha interferon

<400> 93
tgtgatctgc ctcagaccca cagcctgcgt aataggaggg ccttgatact cctggcacaa 60
atggaaagaa tctctccctt ctcctgtctg aaggacagac atgaatttcag attcccgag 120
gaggagttt atggccacca gttccagaag actcaagcca tctctgtcct ccatgagatg 180
atccagcaga ccttcaatct cttcagcaca gaggactcat ctgctgctt ggaacagagc 240
ctcctagaaa aatttccac tgaactttac cagcaactga atgacctgga agcatgtgtg 300
atacaggagg ttggggtgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
agaaaatact tccaaagaat cactcttat ctaatggaga agaaatacag cccttgc 420
tgggaggttgc tcaagcaga aatcatgaga tcctctctt tttcaacaaa cttgaaaaaaa 480
ggattaagga ggaaggattt a 501

<210> 94
<211> 501
<212> DNA
<213> human alpha interferon

<400> 94
tgtgatctgc ctcagactca cagcctgggt aacaggaggg ccttgatact cctggcacaa 60
atgcgaagaa tctctccctt ctcctgcctg aaggacagac atgactttga attccccag 120
gaggagttt atgataaaca gttccagaag gctcaagcca tctctgtcct ccatgagatg 180

atccagcaga cttcaacct cttcagcaca aaggactcat ctgctgctt ggatgagacc 240
cttctagatg aattctacat cgaacttgac cagcagctga atgacctgga gtcctgtgt 300
atgcaggaag tgggggtgat agagtctccc ctgatgaatg aggacttcat cctggctgtg 360
agaaaatact tccaaagaat cactctatat ctgacagaga agaaatacag ctcttgc 420
tggaggttg tcagagcaga aatcatgaga tccttctt tatcaatcaa cttgcaaaaa 480
agattaagga gtaaggaaatg a 501

<210> 95
<211> 501
<212> DNA
<213> human alpha interferon

<400> 95
tgtatctcc ctgagaccca cagcctggat aacaggagga ccttgatgct cctggcacaa 60
atgagcagaa tctctccctc ctccctgtctg atggacagac atgactttgg attccccag 120
gaggagttt atggcaacca gttccagaag gctccagcca tctctgtcct ccatgagctg 180
atccagcaga tcttcaacct cttctccaca aaagattcat ctgctgctt ggatgaggac 240
ctcctagaca aattctgcac cgaactctac cagcagctga atgacttgga agcctgtgt 300
atgcaggagg agaggggtggg agaaaactccc ctgatgtacg cggactccat cctggctgtg 360
agaaaatact tccaaagaat cactcttat ctgacagaga agaaatacag cccttgc 420
tggaggttg tcagagcaga aatcatgaga tccttctt tatcaacaaa cttgcaagaa 480
agattaagga ggaaggaaatg a 501

<210> 96
<211> 501
<212> DNA
<213> human alpha interferon

<400> 96
tgtatctgc ctcagaccca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
atggaaagaa tctctccctt ctccctgcctg aaggacagac atgactttgg attccccaa 120
gaggagttt atggcaacca gttccagaag gctcaagcca tctctgtcct ccatgagatg 180
atccagcaga cttcaatct cttcagcaca aaggactcat ctgctactt ggaacagagc 240
ctcctagaaa aattttccac tgaacttaac cagcagctga atgacatggaa agcctgcgtg 300
atacaggagg ttgggggtgg aagagactccc ctgatgaatg tggactctat cctggctgtg 360
agaaaatact tccaaagaat cactcttat ctgacagaga agaaatacag cccttgc 420
tggaggttg tcagagcaga aatcatgaga tccttctt tatcaacaaa tttcaagaa 480
agattaagga ggaaggaaatg a 501

<210> 97
<211> 501
<212> DNA
<213> human alpha interferon

<400> 97
tgtatctgc ctcagaccca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
atggaaagaa tctctccctt ctccctgcctg aaggacagac ctgactttgg acttccccag 120
gaggagttt atggcaacca gttccagaag actcaagcca tctctgtcct ccatgagatg 180
atccagcaga cttcaatct cttcagcaca gaggactcat ctgctgctt ggaacagagc 240
ctcctagaaa aattttccac tgaactttac cagcaactga ataacctggaa agcatgtgt 300
atacaggagg ttgggatgg aagagactccc ctgatgaatg aggactccat cttggctgtg 360
agaaaatact tccaaagaat cactcttat ctaacagaga agaaatacag cccttgc 420
tggaggttg tcagagcaga aatcatgaga tctctctt tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattg a 501

<210> 98
<211> 501

<212> DNA

<213> human alpha interferon

<400> 98

tgtgatctgc ctcagactca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
atggaaagaa tctctcattt ctccctgcctg aaggacagat atgatttcgg attcccccaag 120
gagggtttg atggcaacca gttccagaag gctcaagcca tctctgcctt ccatgagatg 180
atccagcaga ccttcaatct cttcagcaca aaggattcat ctgctgcctg ggatgagacc 240
ctcctagaca aattctacat tgaactttc cagcaactga atgacctaga agcctgtgtg 300
acacaggagg ttgggggtgga agagattgcc ctgatgaatg aggactccat cctggctgtg 360
aggaaatact ttcaaagaat cactcttat ctgatggaga agaaaatacag cccttgc 420
tgggaggttg tcagagcaga aatcatgaga tccttctt tttcaacaaa cttgcaaaaa 480
ggat�agaa ggaaggattg a 501

<210> 99

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Protease
peptide substrate

<400> 99

Arg Gly Val Val Asn Ala Ser Ser Arg Leu Ala
1 5 10

<210> 100

<211> 44

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Introduced Sfi
I site

<400> 100

ttccatttca tacatggccg aaggggccgt gccatgagga tttt 44

<210> 101

<211> 50

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Introduced sfi
I site

<400> 101

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